Brain Drain Reversal Trends: Implications for the U.S.

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The vote in the Senate was a smashing 96-to-1 to import as many as 200,000 foreign-born workers with college degrees and specialized skills each year for three years. Congressman David Dreier bluntly explained the intent of Congress: "The industry very much wants to make sure that we remain competitive globally. We either import workers or export jobs and industries." So Congress authorized a global "brain drain" from developing countries that desperately need their highly skilled scientists and technology experts.

"Historically, wars between nations have always been about land and its appropriation. Now a new type of war is emerging, the war about technology and its control. This is, I believe, the new threat for the upcoming century." --Shimon Perez

The brain drain has been regarded as a curse for developing countries for decades. Throughout the post-World War II era, the "best and brightest" routinely left for the economic opportunities and higher standards of living in the West. Entire graduating classes from the elite Indian Institutes of Technology emigrated during the 1970s and 1980s. Today, there are at least 30,000 Indian professionals working in Silicon Valley.

Migration rates are known to be higher for highly educated individuals with the important exceptions of Central America and Mexico. A number of countries lost more than 30 percent of those with tertiary education and higher to migration.

Now the "brain drain" is giving way to a process of "brain circulation" as talented immigrants who have studied and worked abroad increasingly return to their home countries to pursue promising opportunities there. Some developing countries are transforming the brain drain from a curse into an asset.

MIIN WU GRADUATED *from the elite National Taiwan University then came to the U.S. in the early 1970s to pursue graduate training in electrical engineering. After earning a doctorate from Stanford University in 1976, Wu recognized that there were no opportunities to use his newly acquired skills in Taiwan and remained in the U.S. He worked for more than a decade in senior positions at Silicon Valley semiconductor companies like Siliconix and Intel. He also gained entrepreneurial experience as a founding member of VLSI Technology. By the late 1980s, economic conditions in Taiwan had improved and Wu returned in 1989 to start one of Taiwan's first semiconductor companies, Macronix Co., in the Hsinchu Science-based Industrial Park. He initially recruited 30 senior engineers, mainly former classmates and friends from Silicon Valley, to return to Taiwan. The firm is now the 6th largest semiconductor maker in Taiwan with over $300 million in sales.*

A New Model of Competition

The traditional, highly integrated corporate structure has given way to vertical fragmentation and increasing firm specialization. Producers no longer compete in all stages of production from design and development to manufacturing, marketing and distribution; rather they focus on a

narrow piece of the value chain in which they can excel while relying on other specialists to provide other components and final system integration.

"In this new competitive environment, the brain circulation provides a crucial advantage to formerly backward regions."

This new model has created unprecedented opportunities for producers located far from established centers of technology. Consider the semiconductor industry. In the past, large corporations performed all of the stages of production internally, and chip production remained the province of the most advanced industrial nations like the U.S. and Japan. Today, the industry is thoroughly fragmented. Scores of specialized Taiwanese producers have become globally competitive by focusing exclusively on semiconductor design or manufacturing. Israel is home to some of the world's most innovative semiconductor equipment manufacturers. Indian firms are among the latest wave of specialists to provide only the intellectual property modules used in chip design.

"We're actually trying to tap into the global market while living in India." -Anshuman Bapna, IIT student

In this new competitive environment, the brain circulation provides a crucial advantage to formerly backward regions. These regions typically have been treated as low-cost production sites for multinationals, but **U.S.-educated and trained engineers can help them leapfrog more advanced economies by transferring up-to-date technology and market information and by jump-starting a localized process of entrepreneurship**. Over time, transnational communities can accelerate the technological upgrading of the regional economy by providing the base of skill and know-how needed to help local producers shift to higher value-added activities. For example, changes in the structure of competition in information technology (IT) industries have not only allowed the growth of software development in India, but also create the possibilities of economic leapfrogging. A report by McKinsey & Co. has forecast that India's IT industry will generate $87 billion in annual revenues, $225 billion in market value, and 2.2 million jobs by the year 2008.

The Silicon Valley-Hsinchu Connection

The economic relationship between Taiwan and the United States was a textbook First-Third-World relationship in the 1970s. Consumer electronics producers invested in Taiwan primarily to take advantage of its low-cost manufacturing labor. Meanwhile, Taiwan's best engineering students came to the United States for graduate education and the majority stayed in the U.S. to pursue professional opportunities that were not available at home. Tens of thousands ended up in Silicon Valley.

Taiwan developed the Hsinchu Science-based Industrial Park as a way to attract Taiwanese

entrepreneurs back from the U.S. These efforts to reverse the brain drain paid off in the late 1980s and early 1990s. When several thousand Taiwanese returned annually from the U.S., even those who remained stayed closely connected to Taiwan's emerging technology sector. Silicon Valley-based engineers formed the Monte Jade Science and Technology Association with the goal of "promoting cooperation and the mutual flow of technology and investment between Taiwan and the U.S." At the same time, a growing number of highly mobile engineers began to work in both the United States and Taiwan, commuting across the Pacific regularly.

The relationship between the Silicon Valley and Hsinchu regional economies today consists of a decentralized mix of formal and informal collaborations between individual investors and entrepreneurs, small and medium-sized firms, and the divisions of larger companies located on both sides of the Pacific. In this complex mix, the trust among Taiwanese engineers with shared professional and educational experiences accelerates flows of capital, skill, and technology, as well as institutional and managerial know-how. Many observers claim that the information flow between the regions is continuous and that Hsinchu is like an extension of Silicon Valley.

Implications for the U.S.

The challenge for the U.S. is to adopt a new approach to achieve a win-win environment based on Brain Sharing of complementary skills, collaboration, and integration. One example for this new paradigm is the idea to create a Bi-National Sustainability Laboratory by the U.S. and Mexico, which is expected to lead to an overall North American prosperity.